

REMARKS

Claims 1-10 are pending in this application.

Applicants have amended claim 2 and have made minor changes to the specification. These changes do not introduce any new matter.

In response to the objection to the drawings, Applicants have amended the specification to add the missing reference numbers cited by the Examiner, namely reference numbers 4 and 5, to the description of Figure 1. Accordingly, Applicants request that the objection to the drawings be withdrawn.

In response to the objection to the Title of the Invention as not being descriptive, Applicants have changed the Title to that suggested by the Examiner, i.e., "Method for Manufacturing Planar Optical Waveguide Having Doped Inorganic-Organic Hybrid Matrix Waveguide Layer." Accordingly, Applicants request that the objection to the Title be withdrawn.

In response to the objection to the disclosure, Applicants have corrected the spelling of "perfluoroalkylsilane" on page 23, line 1, of the specification. Accordingly, Applicants request that the objection to the disclosure on the basis of informalities be withdrawn.

Applicants respectfully request reconsideration of the rejection of claims 2-4 and 8 under 35 U.S.C. § 112, second paragraph, as being indefinite. In response to the Examiner's comments regarding "hydrocarbon atoms," Applicants have amended claim 2 so that this claim specifies "hydrocarbon groups." Regarding claim 8, Applicants note that the terms "benzophenone/amines" and "thioxane/amines" imply decomposition into two chemical groups due to light irradiation, and that this type of representation has been customarily used in the art (see, e.g., Wei, X., "Study on Synthesis, Application and Mechanism of Benzophenone/Amine Initiator," International Conference on Radiation Curing, RadTech Asia '99, 0000132077, pp. 336-342). As such, Applicants respectfully submit that those

skilled in the art would understand what materials are encompassed by the terms “benzophenone/amines” and “thioxane/amines.” In view of the foregoing, Applicants submit that claims 2-4 and 8 now satisfy the definiteness requirement of 35 U.S.C. § 112, second paragraph, and request that the rejection of these claims thereunder be withdrawn.

Applicants respectfully request reconsideration of the rejection of claims 1-3 and 5-10 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. US 2003/0228120 A1 to *Kuramoto et al.* in view of U.S. Patent No. 3,809,732 to *Chandross et al.* As will be explained in more detail below, the combination of *Kuramoto et al.* in view of *Chandross et al.* does not raise a *prima facie* case of obviousness against the subject matter defined in independent claim 1.

The *Kuramoto et al.* reference discloses that organic-inorganic hybrid material may be used as the raw material for a core. In forming the core, the *Kuramoto et al.* reference suggests both forming a groove on a substrate and filling the groove with the organic-inorganic hybrid material, and manufacturing a core through a process of pressing and molding soft organic-inorganic hybrid material by use of a mold. This disclosure, however, cannot be interpreted to mean that the thickness of the core and an optical refractive index can be controlled, as disclosed in *Chandross et al.* The reason why a photo-locking technique is used is not simply to form a core portion as in *Kuramoto et al.*, but to manufacture an optical waveguide having smooth refractive index and thickness profiles between dielectric regions in a device. The density of dopant is generally maximized along an axis of an irradiated beam and gradually reduced from the axis. With this structure, the coarseness of the edge, having resulted in high loss of scattering in conventional devices, can be mostly removed. The *Kuramoto et al.* reference merely suggests the shape of a simple core portion, and does not teach that this structure can be formed by photo-locking. Accordingly, the Examiner's assertion that *Kuramoto et al.* discloses a core portion thicker than the surrounding area, the

same as is disclosed in *Chandross et al.*, is not reasonable. Further, the purpose of the *Kuramoto et al.* reference is not to provide a thicker core portion, but rather to provide a position limitation of the top surface of the core such that the top surface of the core must be positioned lower than the top surface of the substrate, in the structure wherein a groove is formed on the substrate as a lower cladding layer and a core is formed within the groove (see Fig. 12 and claim 1 of the *Kuramoto et al.* reference).

Still further, the *Kuramoto et al.* reference describes that the organic-inorganic hybrid material can be used as the raw material for a core, but does not teach that such material can be used as a matrix, in which photosensitive photochemical monomers are uniformly doped, thereby being capable of inducing photopolymerization to only a region selected by light irradiation. Before the filing date of the subject application, no literature known to Applicants suggests any possibility that an organic-inorganic hybrid material can be used as a matrix, with which the photo-locking mechanism can be realized. Although a technique of applying the photo-locking mechanism to a general organic polymer as a matrix has been publicly known, extending the application of such mechanism to an organic-inorganic hybrid material as a matrix, which is completely different in physical properties or chemical features from an organic polymer such as polymethylmethacrylate (PMMA), is unreasonable. For example, to date it has been determined that, in addition to the photo-locking mechanism disclosed in *Chandross et al.*, other mechanisms including densification, condensation, migration, etc. have been applied together, so as to have an increase in the refractive index and a structure thicker than the surrounding area in the organic-inorganic hybrid material. These mechanisms cannot be expected in the case of making an organic polymer such as PMMA as the matrix.

Moreover, the *Kuramoto et al.* reference expresses reservations about the application of photopolymerization, more precisely, the use of a photopolymerization initiator, in using

the organic-inorganic hybrid material as a core (see paragraph 40 of the *Kuramoto et al.* reference). That is, the *Kuramoto et al.* reference teaches that there would be a problem of degrading optical transmittance when the photopolymerization initiator is used to promote photopolymerization. Upon reading this teaching, one having ordinary skill in the art would not have added a polymerization initiator when an organic-inorganic hybrid material is used as a core. Further, this teaching is suggestive of the difficulty of applying the photo-locking mechanism suggested in the *Chandross et al.* reference.

In view of the foregoing, Applicants respectfully submit that a suggestion to combine the *Kuramoto et al.* reference and the *Chandross et al.* reference in the manner proposed by the Examiner is lacking. Moreover, even if it is deemed that these references may be properly combined (a proposition with which Applicants disagree), the combination is nevertheless improper because a reasonable expectation of success is lacking. Specifically, in light of the “negative” teaching in the *Kuramoto et al.* reference discussed above, one having ordinary skill in the would not have had a reasonable expectation that the photo-locking mechanism of *Chandross et al.* could be successfully implemented using the organic-inorganic hybrid material as a core as set forth in the *Kuramoto et al.* reference. Thus, in the absence of a proper suggestion to combine the references and a reasonable expectation that the combination would be successful, the combination of the *Kuramoto et al.* reference and the *Chandross et al.* reference is improper and, therefore, does not raise a *prima facie* case of obviousness against the subject matter defined in independent claim 1.

Accordingly, for at least the foregoing reasons, independent claim 1 is patentable under 35 U.S.C. § 103(a) over the combination of *Kuramoto et al.* in view of *Chandross et al.* Claims 2, 3, and 5-10, each of which ultimately depends from claim 1, are likewise patentable under 35 U.S.C. § 103(a) over the combination of *Kuramoto et al.* in view of *Chandross et al.* for at least the same reasons set forth for claim 1.

Applicants respectfully request reconsideration of the rejection of claims 2-4 under 35 U.S.C. § 103(a) as being unpatentable over *Kuramoto et al.* in view of *Chandross et al.*, and further in view of U.S. Patent No. 6,144,795 to *Dawes et al.* Each of claims 2-4 ultimately depends from independent claim 1. The *Dawes et al.* reference teaches that an organic-inorganic hybrid material can be used as the raw material for an optical waveguide, but does not teach that the core can be formed by the use of polymerization. As such, the *Dawes et al.* reference does not cure the deficiencies of the combination of *Kuramoto et al.* in view of *Chandross et al.* discussed above with respect to claim 1. Accordingly, for at least the same reasons set forth above regarding claim 1, claims 2-4 are patentable under 35 U.S.C. § 103(a) over the combination of *Kuramoto et al.* in view of *Chandross et al.*, and further in view of *Dawes et al.*

Applicants respectfully request reconsideration of the rejection of claims 1-3 and 5-10 under 35 U.S.C. § 103(a) as being unpatentable over *Chandross et al.* in view of U.S. Patent Application Publication No. US 2003/0195321 A1 to *Zha*. As will be explained in more detail below, the combination of *Chandross et al.* in view of *Zha* does not raise a *prima facie* case of obviousness against the subject matter defined in independent claim 1.

The *Zha* reference teaches that an organic-inorganic hybrid material can be used as the raw material for an optical waveguide, but does not teach that the core can be formed by the use of polymerization. Considering the state of the art at the time the subject application was filed (and without the benefit of hindsight using the teachings set forth in Applicants' specification), one having ordinary skill in the art would not have considered the application of photo-locking to be feasible with a core material formed of an organic-inorganic hybrid material. In this regard, Applicants note that one having ordinary skill in the art is presumed to be aware of the "negative" teaching in the *Kuramoto et al.* reference discussed above (see paragraph 40 of the *Kuramoto et al.* reference). Against this background, Applicants

respectfully submit that the combination of *Chandross et al.* in view of *Zha* lacks both a proper suggestion to combine the references in the manner proposed and also a reasonable expectation that the proposed combination would be successful. Thus, for at least these reasons, the combination of the *Chandross et al.* reference and the *Zha* reference is improper and, therefore, does not raise a *prima facie* case of obviousness against the subject matter defined in independent claim 1.

Accordingly, for at least the foregoing reasons, independent claim 1 is patentable under 35 U.S.C. § 103(a) over the combination of *Chandross et al.* in view of *Zha*. Claims 2, 3, and 5-10, each of which ultimately depends from claim 1, are likewise patentable under 35 U.S.C. § 103(a) over the combination of *Chandross et al.* in view of *Zha* for at least the same reasons set forth for claim 1.

Applicants respectfully request reconsideration of the rejection of claims 2-4 under 35 U.S.C. § 103(a) as being unpatentable over *Chandross et al.* in view of *Zha*, and further in *Dawes et al.* Each of claims 2-4 ultimately depends from independent claim 1. The *Dawes et al.* reference teaches that an organic-inorganic hybrid material can be used as the raw material for an optical waveguide, but does not teach that the core can be formed by the use of polymerization. As such, the *Dawes et al.* reference does not cure the deficiencies of the combination of *Chandross et al.* in view of *Zha* discussed above with respect to claim 1. Accordingly, for at least the same reasons set forth above regarding claim 1, claims 2-4 are patentable under 35 U.S.C. § 103(a) over the combination of *Chandross et al.* in view of *Zha*, and further in view of *Dawes et al.*

In view of the foregoing, Applicants respectfully request reconsideration and reexamination of claims 1-10, as amended herein, and submit that these claims are in condition for allowance. Accordingly, a notice of allowance is respectfully requested. In the event a telephone conversation would expedite the prosecution of this application, the

Application No. 10/671,980
Amendment dated December 29, 2004
Response to Office Action mailed July 29, 2004

Examiner may reach the undersigned at (408) 749-6902. If any additional fees are due in connection with the filing of this paper, then the Commissioner is authorized to charge such fees to Deposit Account No. 50-0805 (Order No. ASIAP119).

Respectfully submitted,
MARTINE & PENILLA, L.L.P.

A handwritten signature in black ink, appearing to read 'P. Martine', with a long horizontal line extending to the right.

Peter B. Martine
Reg. No. 32,043

710 Lakeway Drive, Suite 200
Sunnyvale, California 94085
(408) 749-6900
Customer Number 25920